

**INSTALLER and INSPECTOR QUICK-REFERENCE:
2022 NRCA-MCH-07-A
Supply Fan Variable Flow Controls Systems**

Purpose and Scope of the Test

The purpose of the test is to ensure that the supply fan in a variable air volume application modulates to meet system airflow demand. In most applications, the individual variable air volume (VAV) boxes serving each space will modulate the amount of air delivered to the space based on heating and cooling requirements. As a result, the total supply airflow provided by the central air handling unit must also vary to maintain sufficient airflow through each VAV box. Airflow is typically controlled using a variable frequency drive (VFD) to modulate supply fan speed and vary system airflow. The most common strategy for controlling the VFD is to measure and maintain static pressure within the duct.

Test trigger

Newly Constructed and Additions/Alterations: All new fan systems moving air into, out of, or between conditioned spaces or circulating air for purpose of condition air within the space are prescriptively required to have VAV systems. Fan controls installed on new or existing systems must be tested.

Relevant Energy Code References and Required Compliance Documents

Title 24, Part 6 of the California Building Code, Building Energy Efficiency Standards (Energy Code) sections 140.4(c)2, 170.2(c)4Aii; NA7.5.6; NRCC-MCH-E
Related acceptance tests for these systems include the following:

- NA7.5.1.1 Variable Air Volume Systems Outdoor Air Acceptance

Who Can Perform the Test

This test must be performed by an acceptance test technician certified by a CEC-approved Acceptance Test Technician Certification Provider, using compliance document NRCA-MCH-07-A.

Required Tools

The instrumentation needed to perform the test may include, but is not limited to:

- Differential pressure gauge (must be calibrated within the past year).
- Pitot tube.
- Drill.

Estimated Time to Complete Test

Construction Inspection: 0.5 to 1.5 hours (depending on sensor calibration and minimum VFD speed verification).

Functional testing: 1 to 2 hours (depending on how total fan power at design airflow is determined and system control stability).

**INSTALLER and INSPECTOR QUICK-REFERENCE:
2022 NRCA-MCH-07-A
Supply Fan Variable Flow Controls Systems**

Potential Issues and Cautions

Ensure that all disabled reset sequences are enabled upon completion of this test. Coordinate test procedures with the controls contractor since they may be needed to assist with manipulation of the building automation system (BAS) to achieve the desired operating conditions.

Inspection Enforcement

- Check that the static pressure sensor location, setpoint, and reset control meet the requirements of section 140.4(c)2 or 170.2(c)4Aii, as follows:
 - Location: For a multi-zone system with a static pressure sensor located downstream of major duct splits, multiple sensors must be installed in each major branch while controlling fan capacity to satisfy the sensor furthest below its setpoint.
 - Setpoint: Setpoint must be no greater than one-third of the total design fan static pressure. Note the design total static pressure and the setpoint in inches of water column on the NRCA-MCH-07-A document.
 - Setpoint Reset Control: For systems with direct digital control of individual zone boxes reporting to the central control panel, static pressure set points shall be reset based on the zone requiring the most pressure, i.e., the set point is reset lower until one zone damper is nearly wide open.
- Verify that the supply fan includes a means to modulate airflow such as a variable speed drive.
- Discharge static pressure sensor(s) shall be field calibrated. Performing a field calibration check requires measuring static pressure as close to the existing sensor as possible using a calibrated hand-held measuring device and comparing the field measured value to the value measured by the BAS. When the value measured by the BAS is within 10 percent of the field-measured value, the sensor is calibrated.

Acceptance Criteria

Static pressure sensor(s) is field calibrated to within 10 percent of reference sensor, with differential pressure gauge and pitot tube.
For systems without DDC controls to the zone level the pressure sensor setpoint is less than 1/3 of the supply fan design static pressure.
For systems with DDC controls with VAV boxes reporting to the central control panel, the pressure setpoint is reset by zone demand (box damper position or a trim and respond algorithm or other method that dynamically reduces duct static pressure setpoint as low as possible while maintaining adequate pressure at the VAV box zone(s) of greatest demand).

**INSTALLER and INSPECTOR QUICK-REFERENCE:
2022 NRCA-MCH-07-A
Supply Fan Variable Flow Controls Systems**

Acceptance Criteria (cont.)

At full flow:

- Supply fan maintains discharge static pressure within ± 10 percent of the current operating control static pressure setpoint.
- Supply fan control stabilizes within 5-minute period.

At minimum flow (at least 30 percent of total design flow):

- Supply fan controls modulate to decrease capacity.
- Current operating setpoint has decreased (for systems with DDC to the zone level).

Supply fan maintains discharge static pressure within ± 10 percent of the current operating setpoint.